

## Oliver Sølund Kirsebom

3445 Stanbury St, Halifax, NS, B3L 2X1, Canada

Email: [oliver.kirsebom@gmail.com](mailto:oliver.kirsebom@gmail.com)

Phone: +1 902-209-9788

Homepage: [oliskir.github.io](https://oliskir.github.io)

ORCID ID: [0000-0001-5843-7465](https://orcid.org/0000-0001-5843-7465)

### Brief Bio

I hold a PhD in Nuclear Physics from Aarhus University, Denmark. For more than a decade I was a frequent visitor at accelerator laboratories such as CERN in Switzerland, studying the smallest building blocks of matter. A few years ago, however, I embarked on a new chapter. Eager to put my knowledge and skills to use in a more applied setting, I joined the Institute for Big Data Analytics at Dalhousie University, Canada. As the Senior Staff Scientist on the **MERIDIAN** project, I am now leading a team of data scientists and software developers in creating novel analytical and modelling tools for ocean research, with special emphasis on underwater acoustics.

### Employment

2020 – Present	Senior Staff Scientist, Dalhousie University
2019 – Present	Adjunct Prof., Computer Science, Dalhousie University
2018 – 2020	Lead Acoustic Data Analyst, Dalhousie University
2015 – 2018	Assistant Prof., Dept. of Physics and Astronomy, Aarhus University
2013 – 2015	Postdoc, Dept. of Physics and Astronomy, Aarhus University
2010 – 2013	Postdoc, TRIUMF, University of British Columbia

### University Education

2006 – 2010	PhD Physics, Aarhus University
2005 – 2006	Fulbright student, University of Washington
2002 – 2005	BSc Physics and Mathematics, Aarhus University

### Research Grants

2020 – 2022	DFO Ocean and Freshwater Science Contribution Grant, <i>Building Neural Networks for Classification of Killer Whale Calls</i> , €0.67M (Co-P.I.)
2015 – 2018	The Villum Foundation Young Investigator Programme, <i>Nuclear Astrophysics at the Precision Frontier</i> , €0.41M (P.I.)

### Fellowships, Scholarships, and Awards

2020	Mitacs Accelerate Fellowship, <i>Identification of High-Frequency Periodic Acoustic Fish Tags With Deep learning</i> , €32k
2020	Ocean Frontier Institute Visiting Fellowship, €4k
2019	NVIDIA Accelerated Data Science GPU Grant, €2k
2010	The Villum Foundation Postdoc Fellowship, <i>Experiments in Nuclear Astrophysics With Radioactive Beams at the ISAC-II Facility at TRIUMF</i> , \$190k

2007	Foreign Graduate Student Invitation Program Grant, Tokyo Institute of Technology, Japan
2005	The Danish-American Fulbright Commission; Nordea Danmark-fonden; Faculty of Science, Aarhus University; Etatsråd CG Filtenborg og Hustru Marie Filtenborgs Studieleгат; Observator mag.scient Julie Marie Vinter Hansens Rejselegat, €18k (combined)
2002	International Physics Olympiad Honorable Mention

## Publications

Over 60 peer-reviewed research articles and conference proceedings plus a smaller number of feature articles and viewpoints; 1,047 citations and  $h$ -index of 18. (Google Scholar, 2022.02.05.) A selection of recent or noteworthy papers is provided below. For a complete list, see page 4 or go to [oliskir.github.io](https://oliskir.github.io).

2021	S. Medisetty, <i>et al.</i> , <i>Identification of periodic fish tags with deep learning</i> , The Journal of Ocean Technology <b>16</b> , 134–149.
2021	M. J. Rider, <i>et al.</i> , <i>Space use patterns of sharks in relation to boat activity in an urbanized coastal waterway</i> , Marine Environmental Research <b>172</b> , 105489.
2020	O. S. Kirsebom, <i>et al.</i> , <i>Performance of a deep neural network at detecting North Atlantic right whale upcalls</i> , The Journal of the Acoustical Society of America <b>147</b> , 2636–2646.
2019	O. S. Kirsebom, <i>et al.</i> , <i>Discovery of an Exceptionally Strong <math>\beta</math>-Decay Transition of <math>^{20}\text{F}</math> and Implications for the Fate of Intermediate-Mass Stars</i> , Physical Review Letters <b>123</b> , 262701.
2018	O. S. Kirsebom, <i>et al.</i> , <i>First Accurate Normalization of the <math>\beta</math>-delayed <math>\alpha</math> Decay of <math>^{16}\text{N}</math> and Implications for the <math>^{12}\text{C}(\alpha, \gamma)^{16}\text{O}</math> Astrophysical Reaction Rate</i> , Physical Review Letters <b>121</b> , 142701.
2012	O. S. Kirsebom, <i>et al.</i> , <i>Improved Limit on Direct <math>\alpha</math> Decay of the Hoyle State</i> , Physical Review Letters <b>108</b> , 202501.

## Talks

Numerous ( $> 50$ ) presentations at international conferences and workshops including several invited talks. For a complete list, see [oliskir.github.io](https://oliskir.github.io).

## Software

2020	<a href="#">kadlu</a> , Underwater sound propagation modelling, Python
2019	<a href="#">ketos</a> , Deep learning audio analysis, Python
2018	<a href="#">simX</a> , Nuclear physics monte carlo simulation, C++
2018	<a href="#">Open R-matrix</a> , Nuclear physics modelling, C++

## Teaching

2013 – 2017	Extracurricular programme for 1st-year students, Coordinator
2015	Nuclear astrophysics graduate course, Lecturer
2014	Electromagnetism laboratory course, Coordinator

2006 – 2010      Physics and mathematics undergraduate courses, Teaching Assistant

### Student Supervision

2020 – 2021      Santosh Medisetty, MSc Computer Science, Dalhousie University (Co-supervisor)  
2019 – 2020      Xuhui Liu, MSc Computer Science, Dalhousie University (Co-supervisor)  
2016 – 2017      Helle Bisgaard Sørensen, MSc Physics, Aarhus University (Principal supervisor)  
2014 – 2015      Sofie Tilbæk Nielsen, BSc Physics, Aarhus University (Principal supervisor)

### Conference and Workshop Organization

21–22 Nov 2019    Organizer of the workshop *Detection and Classification in Marine Bioacoustics with Deep Learning* with 30 participants from Canada, the U.S. and Europe.

### Academic Services

2016 – 2018      Member of the Liaison Committee at the Department of Physics and Astronomy, Aarhus University

### Refereeing

Physics Review Letters, Physical Review C, The Astrophysical Journal, Journal of the Acoustical Society of America, Hyperfine Interactions, Methods in Ecology and Evolution, PLOS One

### Professional Memberships

2018 – 2020      Member of the Canadian Acoustical Association  
2013 – 2018      Member of the Danish Physical Society

### Languages

Danish (mother tongue), English (fluent), German (intermediate), Italian (intermediate)

# Publications

## Research Articles

- M. Kuhlwein, K. Lytje, H. O. U. Fynbo, A. Gad, E. Jensen, O. S. Kirsebom, M. Munch, J. Refsgaard, and K. Riisager. *Exclusive decay study of the 16.62 MeV ( $2^-$ ,  $T = 1$ ) resonance in  $^{12}\text{C}$* . Physics Letters B **825**, 136857. ISSN 0370-2693 (2022), URL <http://dx.doi.org/https://doi.org/10.1016/j.physletb.2021.136857>
- S. Medisetty, D. Ouellette, F. Smith, M. Richard, S. Johnston, J. Quirion, J. Newport, C. Whidden, and O. Kirsebom. *Identification of periodic fish tags with deep learning*. The Journal of Ocean Technology **16**, 134–149 (2021)
- M. J. Rider, O. S. Kirsebom, A. J. Gallagher, E. Staatterman, J. S. Ault, C. R. Sasso, T. Jackson, J. A. Browder, and N. Hammerschlag. *Space use patterns of sharks in relation to boat activity in an urbanized coastal waterway*. Marine Environmental Research page 105489. ISSN 0141-1136 (2021), URL <http://dx.doi.org/https://doi.org/10.1016/j.marenvres.2021.105489>
- N. J. Hubbard, C. A. Diget, S. P. Fox, H. O. U. Fynbo, A. M. Howard, O. S. Kirsebom, A. M. Laird, M. Munch, A. Parikh, M. Pignatari, and J. R. Tomlinson. *New Experimental  $^{23}\text{Na}(p)^{26}\text{Mg}$  Reaction Rate for Massive Star and Type Ia Supernova Models*. The Astrophysical Journal **912**, 59 (2021), URL <http://dx.doi.org/10.3847/1538-4357/abee91>
- B. Padovese, F. Frazao, O. S. Kirsebom, and S. Matwin. *Data augmentation for the classification of North Atlantic right whales upcalls*. The Journal of the Acoustical Society of America **149**, 2520–2530 (2021), URL <http://dx.doi.org/10.1121/10.0004258>
- O. S. Kirsebom, A. M. Howard, M. Munch, S. Sablok, J. A. Swartz, and H. O. U. Fynbo. *Experimental study of the  $^{11}\text{B}(p, 3\alpha)\gamma$  reaction at  $E_p = 0.5\text{--}2.7\text{ MeV}$* . The European Physical Journal A **56**, 179 (2020), URL <http://dx.doi.org/10.1140/epja/s10050-020-00183-z>
- O. S. Kirsebom, F. Frazao, Y. Simard, N. Roy, S. Matwin, and S. Giard. *Performance of a deep neural network at detecting North Atlantic right whale upcalls*. The Journal of the Acoustical Society of America **147**, 2636–2646 (2020), URL <http://dx.doi.org/10.1121/10.0001132>
- M. Munch, O. S. Kirsebom, J. A. Swartz, and H. O. U. Fynbo. *Resolving the  $^{11}\text{B}(p, \alpha_0)$  cross-section discrepancies between 0.5 and 3.5 MeV*. The European Physical Journal A **56**, 17 (2020), URL <http://dx.doi.org/10.1140/epja/s10050-019-00016-8>
- O. S. Kirsebom, S. Jones, D. F. Strömberg, G. Martínez-Pinedo, K. Langanke, F. K. Röpke, B. A. Brown, T. Eronen, H. O. U. Fynbo, M. Hukkanen, A. Idini, A. Jokinen, A. Kankainen, J. Kostensalo, I. Moore, H. Möller, S. T. Ohlmann, H. Penttilä, K. Riisager, S. Rinta-Antila, P. C. Srivastava, J. Suhonen, W. H. Trzaska, and J. Äystö. *Discovery of an Exceptionally Strong  $\beta$ -Decay Transition of  $^{20}\text{F}$  and Implications for the Fate of Intermediate-Mass Stars*. Phys. Rev. Lett. **123**, 262701 (2019), URL <http://dx.doi.org/10.1103/PhysRevLett.123.262701>
- O. S. Kirsebom, M. Hukkanen, A. Kankainen, W. H. Trzaska, D. F. Strömberg, G. Martínez-Pinedo, K. Andersen, E. Bodewits, B. A. Brown, L. Canete, J. Cederkäll, T. Enqvist, T. Eronen, H. O. U. Fynbo, S. Geldhof, R. de Groote, D. G. Jenkins, A. Jokinen, P. Joshi, A. Khanam, J. Kostensalo, P. Kuusiniemi, K. Langanke, I. Moore, M. Munch, D. A. Nesterenko, J. D. Ovejás, H. Penttilä, I. Pohjalainen, M. Reponen, S. Rinta-Antila, K. Riisager, A. de Roubin, P. Schotanus, P. C. Srivastava, J. Suhonen, J. A. Swartz, O. Tengblad, M. Vilen, S. Vínals,

- and J. Äystö. *Measurement of the  $2^+ \rightarrow 0^+$  ground-state transition in the  $\beta$  decay of  $^{20}\text{F}$* . Phys. Rev. C **100**, 065805 (2019), URL <http://dx.doi.org/10.1103/PhysRevC.100.065805>
- B. Davids, M. Williams, N. E. Esker, M. Alcorta, D. Connolly, B. R. Fulton, K. Hudson, N. Khan, O. S. Kirsebom, J. Lighthall, and P. Machule. *Initial operation of the recoil mass spectrometer EMMA at the ISAC-II facility of TRIUMF*. Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment **930**, 191–195 (2019), URL <http://dx.doi.org/https://doi.org/10.1016/j.nima.2019.03.070>
- O. S. Kirsebom, O. Tengblad, R. Lica, M. Munch, K. Riisager, H. O. U. Fynbo, M. J. G. Borge, M. Madurga, I. Marroquin, A. N. Andreyev, T. A. Berry, E. R. Christensen, P. D. Fernández, D. T. Doherty, P. Van Duppen, L. M. Fraile, M. C. Gallardo, P. T. Greenlees, L. J. Harkness-Brennan, N. Hubbard, M. Huyse, J. H. Jensen, H. Johansson, B. Jonson, D. S. Judson, J. Konki, I. Lazarus, M. V. Lund, N. Marginean, R. Marginean, A. Perea, C. Mihai, A. Negret, R. D. Page, V. Pucknell, P. Rahkila, O. Sorlin, C. Sotty, J. A. Swartz, H. B. Sørensen, H. Törnqvist, V. Vedia, N. Warr, and H. De Witte. *First Accurate Normalization of the  $\beta$ -delayed  $\alpha$  Decay of  $^{16}\text{N}$  and Implications for the  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$  Astrophysical Reaction Rate*. Physical Review Letters **121**, 142701 (2018), URL <http://dx.doi.org/10.1103/PhysRevLett.121.142701>
- M. Dahl, A. Brun, O. S. Kirsebom, and G. Andresen. *Improving Short-Term Heat Load Forecasts with Calendar and Holiday Data*. Energies **11**, 1678 (2018), URL <http://dx.doi.org/10.3390/en11071678>
- M. Munch, O. S. Kirsebom, J. A. Swartz, K. Riisager, and H. O. U. Fynbo. *Measurement of the full excitation spectrum of the  $^7\text{Li}(p, \gamma)\alpha\alpha$  reaction at 441 keV*. Physics Letters B **782**, 779–784 (2018), URL <http://dx.doi.org/10.1016/j.physletb.2018.06.013>
- J. Refsgaard, H. O. U. Fynbo, O. S. Kirsebom, and K. Riisager. *Three-body effects in the Hoyle-state decay*. Physics Letters B **779**, 414–419 (2018), URL <http://dx.doi.org/10.1016/j.physletb.2018.02.031>
- V. Pseudo, M. J. G. Borge, A. M. Moro, J. A. Lay, E. Nácher, J. Gómez-Camacho, O. Tengblad, L. Acosta, M. Alcorta, M. A. G. Alvarez, C. Andreoiu, P. C. Bender, R. Braid, M. Cubero, A. D. Pietro, J. P. Fernández-García, P. Figuera, M. Fisichella, B. R. Fulton, A. B. Garnsworthy, G. Hackman, U. Hager, O. S. Kirsebom, K. Kuhn, M. Lattuada, G. Marquínez-Durán, I. Martel, D. Miller, M. Moukaddam, P. D. O’Malley, A. Perea, M. M. Rajabali, A. M. Sánchez-Benítez, F. Sarazin, V. Scuderi, C. E. Svensson, C. Unsworth, and Z. M. Wang. *Scattering of the Halo Nucleus  $^{11}\text{Be}$  on  $^{197}\text{Au}$  at Energies around the Coulomb Barrier*. Physical Review Letters **118**, 152502 (2017), URL <http://dx.doi.org/10.1103/physrevlett.118.152502>
- M. V. Lund, A. Andreyev, M. J. G. Borge, J. Cederkll, H. D. Witte, L. M. Fraile, H. O. U. Fynbo, P. T. Greenlees, L. J. Harkness-Brennan, A. M. Howard, M. Huyse, B. Jonson, D. S. Judson, O. S. Kirsebom, J. Konki, J. Kurciewicz, I. Lazarus, R. Lica, S. Lindberg, M. Madurga, N. Marginean, R. Marginean, I. Marroquin, C. Mihai, M. Munch, E. Nacher, A. Negret, T. Nilsson, R. D. Page, S. Pasqu, A. Perea, V. Pucknell, P. Rahkila, E. Rapisarda, K. Riisager, F. Rotaru, C. Sotty, M. Stanoiu, O. Tengblad, A. Turturica, P. V. Duppen, V. Vedia, R. Wadsworth, and N. Warr. *Beta-delayed proton emission from  $^{20}\text{Mg}$* . The European Physical Journal A **52**, 304 (2016), URL <http://dx.doi.org/10.1140/epja/i2016-16304-x>
- K. L. Laursen, H. O. U. Fynbo, O. S. Kirsebom, K. S. Madsbøll, and K. Riisager. *Complete kinematical study of the  $3\alpha$  breakup of the 16.11 MeV state in  $^{12}\text{C}$* . The European Physical Journal A **52**, 271 (2016), URL <http://dx.doi.org/10.1140/epja/i2016-16271-2>

- M. Munch, M. Alcorta, H. O. U. Fynbo, M. Albers, S. Almaraz-Calderon, M. L. Avila, A. D. Ayangeakaa, B. B. Back, P. F. Bertone, P. F. F. Carnelli, M. P. Carpenter, C. J. Chiara, J. A. Clark, B. DiGiovine, J. P. Greene, J. L. Harker, C. R. Hoffman, N. J. Hubbard, C. L. Jiang, O. S. Kirsebom, T. Lauritsen, K. L. Laursen, S. T. Marley, C. Nair, O. Nusair, D. Santiago-Gonzalez, J. Sethi, D. Seweryniak, R. Talwar, C. Ugalde, and S. Zhu. *Independent measurement of the Hoyle state  $\beta$  feeding from  $^{12}\text{B}$  using Gammasphere*. Physical Review C **93**, 065803 (2016), URL <http://dx.doi.org/10.1103/physrevc.93.065803>
- O. S. Kirsebom, P. Bender, A. Cheeseman, G. Christian, R. Churchman, D. S. Cross, B. Davids, L. J. Evitts, J. Fallis, N. Galinski, A. B. Garnsworthy, G. Hackman, J. Lighthall, S. Ketelhut, P. Machule, D. Miller, S. T. Nielsen, C. R. Nobs, C. J. Pearson, M. M. Rajabali, A. J. Radich, A. Rojas, C. Ruiz, A. Sanetullaev, C. D. Unsworth, and C. Wrede. *Measurement of lifetimes in  $^{23}\text{Mg}$* . Physical Review C **93**, 025802 (2016), URL <http://dx.doi.org/10.1103/physrevc.93.025802>
- J. Refsgaard, O. Kirsebom, E. Dijck, H. Fynbo, M. Lund, M. Portela, R. Raabe, G. Randisi, F. Renzi, S. Sambi, A. Sytema, L. Willmann, and H. Wilschut. *Measurement of the branching ratio for  $\beta$ -delayed  $\alpha$  decay of  $^{16}\text{N}$* . Physics Letters B **752**, 296–301 (2016), URL <http://dx.doi.org/10.1016/j.physletb.2015.11.047>
- K. L. Laursen, H. O. U. Fynbo, O. S. Kirsebom, K. S. Madsbøll, and K. Riisager. *Unbound states in  $^{12}\text{C}$  populated by  $\gamma$ -decay of the  $(J^\pi, T) = (2^+, 1)$   $16.11\text{ MeV}$  state*. The European Physical Journal A **52**, 370 (2016), URL <http://dx.doi.org/10.1140/epja/i2016-16370-0>
- V. Margerin, G. Lotay, P. J. Woods, M. Aliotta, G. Christian, B. Davids, T. Davinson, D. T. Doherty, J. Fallis, D. Howell, O. S. Kirsebom, D. J. Mountford, A. Rojas, C. Ruiz, and J. A. Tostevin. *Inverse Kinematic Study of the  $^{26}\text{Al}(d, p)\text{Al}^{27}$  Reaction and Implications for Destruction of  $^{26}\text{Al}$  in Wolf-Rayet and Asymptotic Giant Branch Stars*. Physical Review Letters **115**, 062701 (2015), URL <http://dx.doi.org/10.1103/physrevlett.115.062701>
- A. M. Howard, M. Munch, H. O. U. Fynbo, O. S. Kirsebom, K. L. Laursen, C. A. Diget, and N. J. Hubbard.  *$^{23}\text{Na}(\alpha, p)^{26}\text{Mg}$  Reaction Rate at Astrophysically Relevant Energies*. Physical Review Letters **115**, 052701 (2015), URL <http://dx.doi.org/10.1103/physrevlett.115.052701>
- O. S. Kirsebom, H. O. U. Fynbo, K. Riisager, R. Raabe, and T. Roger. *Analysis of the response of silicon detectors to  $\alpha$  particles and  $^{16}\text{O}$  ions*. Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment **758**, 57–61 (2014), URL <http://dx.doi.org/10.1016/j.nima.2014.05.005>
- K. L. Laursen, O. S. Kirsebom, H. O. U. Fynbo, A. Jokinen, M. Madurga, K. Riisager, A. Saastamoinen, O. Tengblad, and J. Äystö. *High-statistics measurement of the  $\beta$ -delayed  $\alpha$  spectrum of  $^{20}\text{Na}$* . The European Physical Journal A **49**, 79 (2013), URL <http://dx.doi.org/10.1140/epja/i2013-13079-6>
- M. J. G. Borge, L. M. Fraile, H. O. U. Fynbo, B. Jonson, O. S. Kirsebom, T. Nilsson, G. Nyman, G. Possnert, K. Riisager, and O. Tengblad. *Rare  $\beta p$  decays in light nuclei*. Journal of Physics G: Nuclear and Particle Physics **40**, 035109 (2013), URL <http://dx.doi.org/10.1088/0954-3899/40/3/035109>
- O. S. Kirsebom, M. Alcorta, M. J. G. Borge, M. Cubero, H. O. U. Fynbo, M. Madurga, and O. Tengblad. *Observation of  $\alpha$  decay from a state in  $^{10}\text{B}$  at  $11.48\text{ MeV}$* . Physical Review C **85**, 054308 (2012), URL <http://dx.doi.org/10.1103/physrevc.85.054308>
- O. S. Kirsebom, M. Alcorta, M. J. G. Borge, M. Cubero, C. A. Diget, L. M. Fraile, B. R. Fulton, H. O. U. Fynbo, D. Galaviz, B. Jonson, M. Madurga, T. Nilsson, G. Nyman, K. Riisager,



- O. Tengblad, and M. Turrión. *Improved Limit on Direct  $\alpha$  Decay of the Hoyle State*. Physical Review Letters **108**, 202501 (2012), URL <http://dx.doi.org/10.1103/physrevlett.108.202501>
- T. Roger, J. Büscher, B. Bastin, O. S. Kirsebom, R. Raabe, M. Alcorta, J. Äystö, M. J. G. Borge, M. Carmona-Gallardo, T. E. Cocolios, J. Cruz, P. Dendooven, L. M. Fraile, H. O. U. Fynbo, D. Galaviz, L. R. Gasques, G. S. Giri, M. Huyse, S. Hyldegaard, K. Jungmann, W. L. Kruithof, M. Lantz, A. Perea, K. Riisager, A. Saastamoinen, B. Santra, P. D. Shidling, M. Sohani, A. J. Sørensen, O. Tengblad, E. Traykov, D. J. van der Hoek, P. V. Duppen, O. O. Versolato, and H. W. Wilschut. *Precise Determination of the Unperturbed  $^8\text{B}$  Neutrino Spectrum*. Physical Review Letters **108**, 162502 (2012), URL <http://dx.doi.org/10.1103/physrevlett.108.162502>
- M. Alcorta, M. J. G. Borge, M. Cubero, C. A. Diget, R. Domínguez-Reyes, L. M. Fraile, B. R. Fulton, H. O. U. Fynbo, D. Galaviz, S. Hyldegaard, H. Jeppesen, B. Jonson, O. S. Kirsebom, M. Madurga, A. Maira, A. Muñoz-Martín, T. Nilsson, G. Nyman, D. Obradors, A. Perea, K. Riisager, O. Tengblad, and M. Turrión. *Properties of  $^{12}\text{C}$  resonances determined from the  $^{10}\text{B}(^3\text{He}, p\alpha\alpha\alpha)$  and  $^{11}\text{B}(^3\text{He}, d\alpha\alpha\alpha)$  reactions studied in complete kinematics*. Physical Review C **86**, 064306 (2012), URL <http://dx.doi.org/10.1103/physrevc.86.064306>
- O. S. Kirsebom and B. Davids. *One fewer solution to the cosmological lithium problem*. Physical Review C **84**, 058801 (2011), URL <http://dx.doi.org/10.1103/physrevc.84.058801>
- O. S. Kirsebom, H. O. U. Fynbo, A. Jokinen, M. Madurga, K. Riisager, A. Saastamoinen, O. Tengblad, and J. Äystö. *New  $\beta$ -delayed proton lines from  $^{23}\text{Al}$* . The European Physical Journal A **47**, 130 (2011), URL <http://dx.doi.org/10.1140/epja/i2011-11130-4>
- O. S. Kirsebom, S. Hyldegaard, M. Alcorta, M. J. G. Borge, J. Büscher, T. Eronen, S. Fox, B. R. Fulton, H. O. U. Fynbo, H. Hultgren, A. Jokinen, B. Jonson, A. Kankainen, P. Karvonen, T. Kessler, A. Laird, M. Madurga, I. Moore, G. Nyman, H. Penttilä, S. Rahaman, M. Reponen, K. Riisager, T. Roger, J. Ronkainen, A. Saastamoinen, O. Tengblad, and J. Ästö. *Precise and accurate determination of  $^8\text{B}$  decay spectrum*. Physical Review C **83**, 065802 (2011), URL <http://dx.doi.org/10.1103/physrevc.83.065802>
- E. Tengborn, A. M. Moro, T. Nilsson, M. Alcorta, M. J. G. Borge, J. Cederkäll, C. Diget, L. M. Fraile, H. O. U. Fynbo, J. Gomez-Camacho, H. B. Jeppesen, H. T. Johansson, B. Jonson, O. S. Kirsebom, H. H. Knudsen, M. Madurga, G. Nyman, A. Richter, K. Riisager, G. Schrieder, O. Tengblad, N. Timofeyuk, M. Turrión, D. Voulot, and F. Wenander. *The  $^8\text{Li}+^2\text{H}$  reaction studied in inverse kinematics at 3.15 MeV/nucleon using the REX-ISOLDE post-accelerator*. Physical Review C **84**, 064616 (2011), URL <http://dx.doi.org/10.1103/physrevc.84.064616>
- O. S. Kirsebom, M. Alcorta, M. J. G. Borge, M. Cubero, C. A. Diget, R. Dominguez-Reyes, L. M. Fraile, B. R. Fulton, H. O. U. Fynbo, S. Hyldegaard, B. Jonson, M. Madurga, A. M. Martin, T. Nilsson, G. Nyman, A. Perea, K. Riisager, and O. Tengblad. *Breakup of  $^{12}\text{C}$  resonances into three  $\alpha$  particles*. Physical Review C **81**, 064313 (2010), URL <http://dx.doi.org/10.1103/physrevc.81.064313>
- S. Hyldegaard, M. Alcorta, B. Bastin, M. J. G. Borge, R. Boutami, S. Brandenburg, J. Büscher, P. Dendooven, C. A. Diget, P. V. Duppen, T. Eronen, S. P. Fox, L. M. Fraile, B. R. Fulton, H. O. U. Fynbo, J. Huikari, M. Huyse, H. B. Jeppesen, A. S. Jokinen, B. Jonson, K. Jungmann, A. Kankainen, O. S. Kirsebom, M. Madurga, I. Moore, A. Nieminen, T. Nilsson, G. Nyman, G. J. G. Onderwater, H. Penttil, K. Perjuri, R. Raabe, K. Riisager, S. Rinta-Antila, A. Rogachevskiy, A. Saastamoinen, M. Sohani, O. Tengblad, E. Traykov, Y. Wang, K. Wilhelmsen, H. W. Wilschut, and J. Äystö. *R-matrix analysis of the  $\beta$  decays of  $^{12}\text{N}$  and  $^{12}\text{B}$* . Physical Review C **81**, 024303 (2010), URL <http://dx.doi.org/10.1103/physrevc.81.024303>

- O. S. Kirsebom, M. Alcorta, M. J. G. Borge, M. Cubero, C. A. Diget, R. Dominguez-Reyes, L. Fraile, B. R. Fulton, H. O. U. Fynbo, D. Galaviz, G. Garcia, S. Hyldegaard, H. Jeppesen, B. Jonson, P. Joshi, M. Madurga, A. Maira, A. Muñoz, T. Nilsson, G. Nyman, D. Obradors, A. Perea, K. Riisager, O. Tengblad, and M. Turrión. *Observation of  $\gamma$ -delayed  $3\alpha$  breakup of the 15.11 and 12.71 MeV states in  $^{12}\text{C}$* . Physics Letters B **680**, 44–49 (2009), URL <http://dx.doi.org/10.1016/j.physletb.2009.08.034>
- S. Hyldegaard, C. Forssén, C. Diget, M. Alcorta, F. Barker, B. Bastin, M. Borge, R. Boutami, S. Brandenburg, J. Bscher, P. Dendooven, P. V. Duppen, T. Eronen, S. Fox, B. Fulton, H. Fynbo, J. Huikari, M. Huyse, H. Jeppesen, A. Jokinen, B. Jonson, K. Jungmann, A. Kankainen, O. Kirsebom, M. Madurga, I. Moore, P. Navrátil, T. Nilsson, G. Nyman, G. Onderwater, H. Penttil, K. Perjuri, R. Raabe, K. Riisager, S. Rinta-Anttila, A. Rogachevskiy, A. Saastamoinen, M. Sohani, O. Tengblad, E. Traykov, J. Vary, Y. Wang, K. Wilhelmsen, H. Wilschut, and J. Äystö. *Precise branching ratios to unbound  $^{12}\text{C}$  states from  $^{12}\text{N}$  and  $^{12}\text{B}$   $\beta$ -decays*. Physics Letters B **678**, 459–464 (2009), URL <http://dx.doi.org/10.1016/j.physletb.2009.06.064>
- M. Alcorta, O. S. Kirsebom, M. Borge, H. Fynbo, K. Riisager, and O. Tengblad. *A complete kinematics approach to study multi-particle final state reactions*. Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment **605**, 318–325 (2009), URL <http://dx.doi.org/10.1016/j.nima.2009.03.246>
- M. Madurga, M. Borge, M. Alcorta, L. Fraile, H. Fynbo, B. Jonson, O. S. Kirsebom, G. Martínez-Pinedo, T. Nilsson, G. Nyman, A. Perea, A. Poves, K. Riisager, O. Tengblad, E. Tengborn, and J. V. der Walle. *Evidence of a new state in  $^{11}\text{Be}$  observed in the  $^{11}\text{Li}$  beta-decay*. Physics Letters B **677**, 255–259 (2009), URL <http://dx.doi.org/10.1016/j.physletb.2009.05.050>
- H. O. U. Fynbo, R. Álvarez-Rodríguez, A. S. Jensen, O. S. Kirsebom, D. V. Fedorov, and E. Garrido. *Three-body decays and R-matrix analyses*. Physical Review C **79**, 054009 (2009), URL <http://dx.doi.org/10.1103/physrevc.79.054009>
- M. Madurga, M. J. G. Borge, M. Alcorta, L. M. Fraile, H. O. U. Fynbo, B. Jonson, O. S. Kirsebom, T. Nilsson, G. Nyman, A. Perea, K. Riisager, O. Tengblad, E. Tengborn, and J. V. der Walle. *Kinematic identification of the  $\beta t$  branch in the decay of  $^{11}\text{Li}$* . The European Physical Journal A **42**, 415 (2009), URL <http://dx.doi.org/10.1140/epja/i2008-10769-0>
- R. Álvarez-Rodríguez, A. S. Jensen, E. Garrido, D. V. Fedorov, H. O. U. Fynbo, and O. S. Kirsebom. *Three-Body Decays: Structure, Decay Mechanism and Fragment Properties*. Few-Body Systems **45**, 149–152 (2009), URL <http://dx.doi.org/10.1007/s00601-009-0010-2>

## Feature Articles

- O. Kirsebom, S. Medisetty, C. Whidden, D. Ouellette, F. Smith, J. Quirion, and S. Johnston. *Advancing Acoustic Fish Tracking with Deep Learning*. The Journal of Ocean Technology **16**, 124–125 (2021)
- F. Frazao, O. Kirsebom, B. Padovese, and S. Matwin. *Embedded Deep Learning for Underwater Acoustics*. The Journal of Ocean Technology **15**, 174–175 (2020)
- O. Kirsebom. *At eksplodere eller at implodere?* Aktuell Naturvidenskab **4-2020**, 21–25 (2020)
- O. Kirsebom, F. Frazao, I. Hessler, and S. Matwin. *Towards Versatile and Adaptive Detection Algorithms in Underwater Acoustics*. The Journal of Ocean Technology **14**, 144–145 (2019)
- O. S. Kirsebom. *Watching the Hoyle State Fall Apart*. Physics **10**, 103 (2017), URL <http://dx.doi.org/10.1103/physics.10.103>



D. Jenkins and O. S. Kirsebom. *The secret of life*. Physics World **26**, 23–26 (2013), URL <http://dx.doi.org/10.1088/2058-7058/26/02/32>

## Conference Proceedings

- D. Nguyen, O. S. Kirsebom, F. Frazo, R. Fablet, and S. Matwin. *Recurrent Neural Networks with Stochastic Layers for Acoustic Novelty Detection*. In *ICASSP 2019 - 2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 765–769. ISSN 2379-190X (2019), URL <http://dx.doi.org/10.1109/ICASSP.2019.8682901>
- J. A. Swartz, H. O. U. Fynbo, K. L. Andersen, M. Munch, and O. S. Kirsebom. *Investigating  $^{16}\text{O}$  via the  $^{15}\text{N}(p,\alpha)^{12}\text{C}$  reaction*. AIP Conference Proceedings **2038**, 020014 (2018), URL <http://dx.doi.org/10.1063/1.5078833>
- R. Garg, C. Barton, C. A. Diget, S. Courtin, G. Fruet, H. O. U. Fynbo, A. Howard, A. Illana, D. G. Jenkins, I. Marroquin, O. S. Kirsebom, M. V. Lund, I. Moore, A. Perea, J. Refsgaard, J. E. Riley, S. Rinta-Antila, L. Sinclair, and O. T. and. *Rotational excitation of the Hoyle state in  $^{12}\text{C}$* . Journal of Physics: Conference Series **940**, 012043 (2018), URL <http://dx.doi.org/10.1088/1742-6596/940/1/012043>
- O. S. Kirsebom. *Experimental progress in clarifying the excitation spectrum of  $^{12}\text{C}$* . Journal of Physics: Conference Series **863**, 012018 (2017), URL <http://dx.doi.org/10.1088/1742-6596/863/1/012018>
- M. J. G. Borge, V. Pesudo, E. Nácher, O. Tengblad., M. Cubero., A. Perea, A. M. Moro, J. A. Lay, J. Gómez-Camacho., M. A. G. Alvarez, J. P. Fernandez-Garcia, A. D. Prieto, P. Figuera, M. Fisichella., M. Lattuada., V. Scuderi, G. Marquínez-Durán, I. Martel., A. M. Sánchez-Benítez, M. Alcorta., P. C. Bender, R. Braid., A. B. Garnsworthy, G. Hackman., D. Miller., M. Moukaddam., M. Rajabali., C. Unsworth., Z. Wang, B. R. Fulton, U. Hager, O. Kirsebom, K. Kuhn., P. O'Malley., F. Sarazin, and C. Svensson. *Scattering Of The Halo Nucleus  $^{11}\text{Be}$  On A  $^{197}\text{Au}$  Target At Energies Around The Coulomb Barrier*. In *Proceedings of The 26th International Nuclear Physics Conference — PoS(INPC2016)*. Sissa Medialab (2017), URL <http://dx.doi.org/10.22323/1.281.0207>
- S. Courtin, G. Fruet, D. G. Jenkins, M. Heine, D. Montanari, L. G. Morris, G. Lotay, P. H. Regan, O. S. Kirsebom, S. D. Negra, F. Hammache, N. de Sereville, B. Bastin, F. de Oliveira, G. Randisi, C. Stodel, C. Beck, and F. Haas. *Fusion Cross Sections of Astrophysics Interest Within the STELLA Project*. In *Proceedings of the 14th International Symposium on Nuclei in the Cosmos (NIC2016)*. Journal of the Physical Society of Japan (2017), URL <http://dx.doi.org/10.7566/jpscp.14.021001>
- O. S. Kirsebom, I. M. Alonso, T. Berry, M. J. G. Borge, E. R. Christensen, D. Doherty, P. D. Fernández, M. M. Flores, H. O. U. Fynbo, M. C. Gallardo, N. Hubbard, J. H. Jensen, H. Johansson, B. Jonson, R. Lica, M. V. Lund, A. P. Martínez, M. K. Munch, K. Riisager, O. Sorlin, J. A. Swartz, O. Tengblad, and V. Vedia. *Improved experimental determination of the branching ratio for  $\beta$ -delayed  $\alpha$  decay of  $^{16}\text{N}$* . EPJ Web of Conferences **165**, 01031 (2017), URL <http://dx.doi.org/10.1051/epjconf/201716501031>
- O. S. Kirsebom, J. Cederkäll, D. G. Jenkins, P. Joshi, R. Julin, A. Kankainen, T. Kibédi, O. Tengblad, and W. H. Trzaska. *Towards an Experimental Determination of the Transition Strength Between the Ground States of  $^{20}\text{F}$  and  $^{20}\text{Ne}$* . In *Proceedings of the 14th International Symposium on Nuclei in the Cosmos (NIC2016)*. Journal of the Physical Society of Japan (2017), URL <http://dx.doi.org/10.7566/jpscp.14.021008>
- S. Courtin, C. Jiang, G. Fruet, M. Heine, D. Jenkins, P. Adsley, L. Morris, P. Regan, M. Rudigier, D. Montanari, S. D. Negra, N. de Séréville, F. Haas, F. Hammache, O. Kirsebom, J. Lesrel,

- A. Meyer, D. Montanari, K. Auranen, M. Avila, A. Ayangeakaa, B. Back, S. Bottoni, M. Carpenter, C. Dickerson, B. DiGiovine, J. Greene, D. Henderson, C. Hoffman, R. Janssens, B. Kay, S. Kuvin, T. Lauritsen, R. Pardo, K. Rehm, D. Santiago-Gonzalez, J. Sethi, D. Seweryniak, R. Talwar, C. Ugalde, S. Zhu, C. Deibel, S. Marley, D. Bourgin, C. Stodel, A. Lefebvre-Schuhl, S. Almaraz-Calderon, X. Fang, X. Tang, M. Alcorta, B. Bucher, M. Albers, and P. Bertone. *Cross section measurements in the  $^{12}\text{C} + ^{12}\text{C}$  system*. EPJ Web of Conferences **165**, 01015 (2017), URL <http://dx.doi.org/10.1051/epjconf/201716501015>
- G. Fruet, S. Courtin, D. G. Jenkins, M. Heine, D. Montanari, L. G. Morris, P. Adsley, C. Beck, S. D. Negra, F. Haas, F. Hammache, O. S. Kirsebom, A. Meyer, P. H. Regan, M. Rudiger, N. de Séréville, and C. Stodel. *Fusion cross section measurements of astrophysical interest for light heavy ions systems within the STELLA project*. EPJ Web of Conferences **163**, 00018 (2017), URL <http://dx.doi.org/10.1051/epjconf/201716300018>
- V. Pesudo, M. J. G. Borge, A. M. Moro, J. A. Lay, E. Nácher, J. Gómez-Camacho, O. Tengblad, L. Acosta, M. Alcorta, M. Alvarez, C. Andreoiu, P. Bender, R. Braid, M. Cubero, A. D. Pietro, J. P. Fernández-García, P. Figuera, M. Fisichella, B. R. Fulton, A. Garmsworthy, G. Hackman, U. Hager, O. S. Kirsebom, K. Kuhn, M. Lattuada, G. Marquínez-Durán, I. Martel, D. Miller, M. Moukaddam, P. D. O'Malley, A. Perea, M. M. Rajabali, A. M. Sánchez-Benítez, F. Sarazin, V. Scuderi, C. E. Svensson, C. Unsworth, and Z. M. Wang. *Scattering of halo nuclei on heavy targets at energies around the Coulomb barrier: The case of  $^{11}\text{Be}$  on  $^{197}\text{Au}$* . EPJ Web of Conferences **163**, 00045 (2017), URL <http://dx.doi.org/10.1051/epjconf/201716300045>
- M. Heine, S. Courtin, G. Fruet, D. Jenkins, D. Montanari, P. Adsley, C. Beck, S. D. Negra, P. Dené, F. Haas, F. Hammache, G. Heitz, O. Kirsebom, M. Krauth, J. Lesrel, A. Meyer, L. Morris, P. Regan, M. Richer, M. Rudigier, N. de Séréville, and C. Stodel. *Sub-barrier fusion cross section measurements with STELLA*. EPJ Web of Conferences **165**, 01029 (2017), URL <http://dx.doi.org/10.1051/epjconf/201716501029>
- I. Marroquin, M. Borge, A. Ciemny, H. de Witte, L. Fraile, H. Fynbo, A. Garzón-Camacho, A. Howard, H. Johansson, B. Jonson, O. Kirsebom, G. Koldste, R. Lica, M. Lund, M. Madurga, C. Mazzocchi, C. Mihai, M. Munch, S. Nae, E. Nacher, A. Negret, T. Nilsson, A. Perea, J. Refsgaard, K. Riisager, E. Rapisarda, C. Sotty, M. Stanoiu, O. Tengblad, A. Turturica, and M. Vedia. *Multi-particle Emission from  $^{31}\text{Ar}$  at ISOLDE*. Acta Physica Polonica B **47**, 747 (2016), URL <http://dx.doi.org/10.5506/aphyspolb.47.747>
- O. S. Kirsebom, H. O. U. Fynbo, A. M. Howard, and K. L. Laursen. *Applying new tools to old problems: experimental studies of resonances in  $^{12}\text{C}$* . Journal of Physics: Conference Series **569**, 012013 (2014), URL <http://dx.doi.org/10.1088/1742-6596/569/1/012013>
- K. L. Laursen, H. O. U. Fynbo, A. M. Howard, and O. S. Kirsebom. *Complete kinematics study of the  $p + ^{11}\text{B} \rightarrow ^{12}\text{C}$  reaction*. Journal of Physics: Conference Series **569**, 012073 (2014), URL <http://dx.doi.org/10.1088/1742-6596/569/1/012073>
- V. Pesudo, M. J. G. Borge, A. Moro, E. Nacher, L. Acosta, M. Alcorta, M. A. G. Alvarez, G. Ball, P. Bender, R. Braid, M. Cubero, A. di Pietro, J. Fernandez-Garcia, P. Figuera, M. Fisichella, B. R. Fulton, A. B. Garmsworthy, J. Gomez-Camacho, G. Hackman, O. S. Kirsebom, K. Kuhn, R. Krecken, M. Lattuada, J. Lay, G. Marquínez-Durán, I. Martel, D. Miller, M. Moukaddam, P. D. O'Malley, A. Perea, M. M. Rajabali, A. M. Sánchez-Benítez, F. Sarazin, V. Scuderi, C. E. Svensson, O. Tengblad, C. Unsworth, and Z. Wang. *Reaction of the Halo Nucleus  $^{11}\text{Be}$  on Heavy Targets at Energies Around the Coulomb Barrier*. Acta Physica Polonica B **45**, 375 (2014), URL <http://dx.doi.org/10.5506/aphyspolb.45.375>
- O. S. Kirsebom.  *$^{12}\text{C}$  and the triple- $\alpha$  reaction rate*. Journal of Physics: Conference Series **436**, 012072 (2013), URL <http://dx.doi.org/10.1088/1742-6596/436/1/012072>

- C. A. Diget, H. O. U. Fynbo, K. L. Laursen, K. O. Madsbøl, L. Jørgensen, O. S. Kirsebom, and K. Riisager. *Complete kinematics measurement of the  $^{11}\text{B}(p, \gamma)3\alpha$  reaction*. Journal of Physics: Conference Series **381**, 012116 (2012), URL <http://dx.doi.org/10.1088/1742-6596/381/1/012116>
- O. S. Kirsebom. *Decay of  $^{12}\text{C}^*$  into Three  $\alpha$  Particles*. Few-Body Systems **54**, 755–759 (2012), URL <http://dx.doi.org/10.1007/s00601-012-0441-z>
- M. Alcorta, M. J. G. Borge, M. Cubero, C. A. Diget, R. Dominguez-Reyes, L. Fraile, B. R. Fulton, H. O. U. Fynbo, D. Galaviz, S. Hyldegaard, H. B. Jeppesen, B. Jonson, O. S. Kirsebom, M. Madurga, A. Maira, A. Muñoz, T. Nilsson, G. Nyman, D. Obradors, A. Perea, K. Riisager, O. Tengblad, and M. Turrión. *Properties of resonances in  $^{12}\text{C}$  above the triple-alpha threshold*. Journal of Physics: Conference Series **312**, 092013 (2011), URL <http://dx.doi.org/10.1088/1742-6596/312/9/092013>
- O. Kirsebom, H. O. Fynbo, H. H. Knudsen, K. Riisager, B. R. Fulton, A. Laird, S. P. Fox, M. J. G. Borge, M. Madurga, O. Tengblad, M. Alcorta, B. Jonson, G. Nyman, H. Hultgren, R. Raabe, J. Büscher, A. Saastamoinen, A. Jokinen, I. D. Moore, and J. Äystö. *The  $^8\text{B}$  neutrino spectrum*. In *Proceedings of 11th Symposium on Nuclei in the Cosmos — PoS(NIC XI)*. Sissa Medialab (2011), URL <http://dx.doi.org/10.22323/1.100.0016>
- M. Alcorta, M. J. G. Borge, M. Cubero, R. Dominguez-Reyes, L. Fraile, B. Fulton, H. O. U. Fynbo, D. Galaviz, S. Hyldegaard, H. Jeppesen, B. Jonson, O. Kirsebom, M. Madurga, A. Maira, A. Muñoz, T. Nilsson, G. Nyman, D. Obradors, A. Perea, K. Riisager, O. Tengblad, M. Turrión, M. Milin, T. Niksic, S. Szilner, and D. Vretenar. *Nuclear Structure of  $^{12}\text{C}$  from Break-up Studies in Complete Kinematics*. In *AIP Conference Proceedings*. AIP (2009), URL <http://dx.doi.org/10.1063/1.3232093>
- H. O. U. Fynbo, C. A. Diget, S. Hyldegaard, H. B. Jeppesen, H. H. Knudsen, O. Kirsebom, K. Riisager, M. Alcorta, R. Boutami, M. J. G. Borge, M. Madurga, O. Tengblad, S. Brandenburg, P. Dendooven, K. Jungmann, G. J. G. Onderwater, A. Rogachevskiy, M. Sohani, E. Traykov, H. W. Wilschut, J. Büscher, P. V. Duppen, M. Huyse, R. Raabe, T. Eronen, J. Huikary, A. Jokinen, A. Kankainen, K. Peräjärvi, I. Moore, A. Nieminen, H. Penttil, S. Rinta-Antila, A. Saastamoinen, Y. Wang, J. Äystö, B. Jonson, T. Nilsson, G. Nyman, K. Wilhelmsen, B. Fulton, S. Fox, and F. C. Barker. *The  $\beta$ -decay approach for studying  $^{12}\text{C}$* . Journal of Physics: Conference Series **111**, 012003 (2008), URL <http://dx.doi.org/10.1088/1742-6596/111/1/012003>

## Software

- O. S. Kirsebom and M. Smith. *kadlu* (2020), URL <https://pypi.org/project/kadlu/>
- F. Frazao and O. S. Kirsebom. *ketos* (2019), URL <https://pypi.org/project/ketos/>
- M. Munch, O. S. Kirsebom, and J. Refsgaard. *Open R-matrix* (2018), URL <http://dx.doi.org/10.5281/zenodo.1174079>
- M. Munch, J. H. Jensen, and O. S. Kirsebom. *simX* (2018), URL <http://dx.doi.org/10.5281/zenodo.1320121>